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PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Latex Gloves Allergy in Dental Workers, Iran

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Abstract: Dermal- respiratory reactions to latex glove is a common problem and sometimes life threatening. Some of the health related past histories such as hand dermatitis, atopy and food allergy increase the probability of these reaction. The purpose of this study was to evaluate reactions to latex gloves amongst dental workers in military dental health centers. In this cross-sectional descriptive survey, dental workers with minimum three months length of employment and most often use of latex gloves were asked to fill standard questionnaire regarding latex related clinical manifestation and personal medical history and predisposing factors. Those with clinical problems did Skin Prick Test (SPT). In this study 330 personnel were assessed. The mean age and length of employment was 31.6 and 8 years, respectively. The most occupation was dentistry. A total of 232 subjects (70.3%) reported latex gloves-allergic symptoms. 72 (21.8%) of persons have history of atopy and food allergy was seen in 114 (34.5%). 63 (19.1%) of subjects reported history of hand dermatitis. All of these had positive regression with allergic responses. Among 73 (34%) symptom positives, 28 (38%) had positive result of SPT. In this survey, the prevalence of allergic reactions is higher than similar studies, which may be due to type of gloves, lack of preemployment assessments and other factors. Because of relationship between allergic reactions to latex gloves and some medical histories, it seems to be necessary for preemployment evaluation and periodic health surveillance of dental workers.

Key words: Latex gloves, allergy, dental workers, Skin Prick Test

INTRODUCTION

Latex, a sap from the rubber tree, is found in many products used in everyday life. Latex is composed of compounds that may cause an allergic reaction, whose severity can range from irritant dermatitis to type IV dermatitis to type I systemic reaction. Recognition of the signs and symptoms associated with these reactions by the health care professional may help to prevent a more severe reaction from occurring. Reactions can be complicated by contact with other substances, thus causing a cross-reaction. Some individuals are more at risk of latex allergies due to repetitive exposure to latex through their career paths, multiple surgeries, other allergies, or respiratory conditions (Binkley *et al.*, 2003).

The use of latex gloves has been increased since last decades of 20th century. In response to recognition of human immunodeficiency and escalating incidence of hepatitis, universal precaution became obligatory for workers in the healthcare fields. So allergic reactions to latex have become a significant occupational health problem among health care workers (HCWs) such as dental workers. For example, natural rubber latex (NRL) is the most frequent cause of occupational respiratory problems in HCWs (Mead *et al.*, 2002; Ownby, 2002;

Pourpak *et al.*, 2004; Hamann *et al.*, 2005a, b; Leggat and Smith, 2006).

Eczematous reactions to latex gloves have been associated with both immediate and delayed hypersensitivity. The clinical manifestation of type I hypersensitivity reactions originated by latex are contact urticaria, sneezing, asthma and rarely anaphylactic shock and death (Ownby, 2002).

Although latex is a common allergen the prevalence of NRL allergy in general and specified populations in Iran is unknown. Latex related symptoms had less been evaluated in dental workers compared with other HCWs. Because of wearing gloves more hours, daily dental workers are excellent group for studying adverse effects to latex.

The objective of this cross-sectional descriptive study was to determine the prevalence of latex and risk factors for latex sensitization among dental workers in Iran.

MATERIALS AND METHODS

In this descriptive cross-sectional study dental workers from an academic clinic in Tehran with at least 3 months of employment and most often use of latex

gloves were asked to response. In this way a modified and anonymous latex gloves sensitization questionnaire from Medical University of South California (MUSC) were filled by a general physician. The questionnaire comprises demographic data (e.g., age, sex, job etc.), medical symptoms due to use of gloves (dermal and respiratory) and related past medical and familial histories.

Those subjects with at least one manifestation of latex gloves related allergies were invited to do skin prick test (SPT) with an antigen extracted from latex gloves and by the scarification method. This test is used for type I latex-sensitivity diagnosis. To perform the test, a drop of latex extract is placed on the skin and the skin is scratched with a sharp, bifurcated needle. The person is monitored for signs of an allergic reaction. SPT was performed by an immunologist and commercial latex extract from Allergofarm, Hamburg, Germany was used. Normal saline was used for negative control and histamine (1 mg mL⁻¹) as appositive control. Result of test was read 15 min after application and was consider positive if the main diameter of the wheel was at least 3 mm.

Descriptive statistic included means and ranges for continuous variables as well as frequencies and percentages for nominal and discrete variables. Student's t-test was used for comparison of means and non parametric data were compared by χ^2 analysis.

A logistic regression analysis was used to analyze the effect of the variables on the occurrence of latex gloves sensitization.

A p-value less than 0.05 was regarded as statistically significant. All statistical calculations were carried out by SPSS 13.0 for windows.

RESULTS

Of 360 staffs who had requirements for entering the study, 330 persons accepted to response which 234(70/9%) of them were women. Mean value and standard deviation of age was 31.6±6.88 and the mean length of employment was 8±6.49 years. One hundred and forty seven persons (44.5%) were dentist. The

number of assistant, dental hygienist and nurses were 66(20), 72(21.9) and 45(13.7%), respectively.

In this study, 232(70.3%) of the subjects showed at least one type of allergic reactions. Of these, 201(60.9%) had a history of skin sensitization to latex gloves (Table 1). Evidence of respiratory tract symptoms manifested as rhinitis, sneeze, sense of pruritus etc were seen in 123(37.3%) subjects. 30(9.1%) of personnel had lower respiratory tract presentation (dyspnea, wheezing, chest discomfort). Anaphylactic reactions have not been occurred for all participants. Diminution of symptoms was seen after use of inner layer of cotton in 270(81.8%). Association between various type of symptoms and sex were positive (p = 0.012). Predisposing factors, which evaluated were hand dermatitis, past history of atopy and allergy to food. Results of this evaluation are shown in Table 2.

The independent variables that had evaluated were age, gender, job, family history of allergic responses, length of employment and number of glove exchange per day.

There was no difference between allergic presentations in various jobs (p = 0.74) and for age (p = 0.834). The mean number of hours of latex exposure each week at work was 30±3.4 with no significant relationship with allergic symptoms (p = 0.020) also length of employment had no effects on probability of allergy. History of allergy had positive association with present occupational allergic responses.

Association between various types of symptoms and the female sex were positive (p = 0.030).

Family history of allergy was present in 65(19.6%) and relationship of this result with latex gloves symptoms was negative (p = 0.045).

Of total number of persons who had symptoms of latex allergy, 73(34%) volunteers underwent SPT. Among SPT group 28(38%) present positive result of latex product. Breakdown, by job, of latex positive cases is as follows: 12 dentist (43%), 7 assistants (25%) and 9 dental hygienist (32%). No significant difference was seen in positive pattern of test due to age, sex and job.

Table 1: Distribution of symptoms due to latex gloves among dental workers

Job	Type of allergy											
	Dermatitis			Urticaria			URT symptoms			LRT symptoms		
	Yes	No	Total	Yes	No	Total	Yes	No	Total	Yes	No	Total
Dentist	69	78	147	7	140	147	34	113	147	3	144	147
Assistant	48	18	66	4	62	66	31	35	66	10	56	66
Dental hygienist	37	35	72	6	66	72	37	35	72	17	55	72
Nurse	27	18	45	3	421	45	21	24	45	0	45	45
Total	181	149	330	20	310	330	123	207	330	20	310	330

URT: Upper Respiratory Tract, LRT: Lower Respiratory Tract

Table 2: Predisposing factors for latex gloves allergy among dental workers and their association with clinical problems

Factor/Variable	Prevalence	p-value
Hand dermatitis	63 (19.1)	0.031
Allergy to food	114 (34.5)	0.003
History of atopia	72 (21.8)	0.024

DISCUSSION

Latex gloves health problems are a common and important issues in occupational medicine. HCWs have an increased risk of sensitization and allergic symptoms to latex (Bousquet *et al.*, 2006).

Prevalence of latex allergy may rise to 11% up to 36% among health care workers (Compare with 2% in general population) (Charous *et al.*, 2002; Ahmed, 2003; Kose and Mandracoglu, 2004) (Table 3).

Present findings indicate a significant occupational health problem among dental personnel wearing latex gloves. Response rate indicates that almost all of dental work force entered in this study (91.6%) and all groups with various demographic characteristics were likely to response. In other word the sample (volunteers) was representative of study population.

This study suggested that more than 70% of subjects had some allergic problems with latex gloves which were more than two fold of other studies, (Lusi *et al.*, 2004) although prevalence of latex allergy is not equal in various studies (Lusi *et al.*, 2004; Zeiss *et al.*, 2003; Ozkan and Gokdogan, 2003; Lopes *et al.*, 2004). Rate of true symptoms seems to be lower because of information and recall bias in subjects' reports (Table 3). The excess in prevalence of manifestations should be inspected by means of:

- Subjective data extracted from the questionnaire.
- More hours of use of gloves with low exchangerate.
- More daily hours of work in health sectors in Iran.
- Inappropriate quality of gloves which are used in this clinic.
- High prevalence of overall sensitization to latex gloves in Iran.

The most common site of allergy reported was skin, URT and LRT respectively (Table 1 and 2). Logistically these symptoms are more common than general population (8-25%). Adverse respiratory effects could confound with physical condition of workplace, sick building syndrome, somatoform presentations background of cardiopulmonary problems and sensitization to dental materials. In any case, some Para clinical measures such as spirometry nasal peak flowmetry may be necessary to exclude these etiologies (Joseph, 2004).

Table 3: Different recent studies in HCWs about latex related health problems

Country	Year	Sample size	Prevalence of latex allergy (%)
Australia (Smith <i>et al.</i> , 2005)	2005	148	43.2-59.3
Thailand (Chaiear <i>et al.</i> , 2006)	2006	412	24
Italy (Filon <i>et al.</i> , 2006)	2006	1040	21.8
Jordan (Khader <i>et al.</i> , 2005)	2005	500	13.6
Indonesia (Huda <i>et al.</i> , 2005)	2005	830	6.1
USA (Hamann <i>et al.</i> , 2005a, b)	2005	582	4.8

According to other studies 25% of HCWs have latex related allergy with the most common manifestations of hand dermatitis and itching (86.3%), contact urticaria (2.9%) and respiratory symptoms (Lusi *et al.*, 2004). About 44.6% of these have positive history of atopia and 3.6% specific IgE to latex. Factors related to workplace mainly time of daily work, time of gloves use and number of gloves exchange influence incidence of latex related symptoms which we found no significant relationship with symptoms except for exchange of gloves. The more gloves exchange the low probability of symptoms. In Table 3 there some recent studies around the world and their main result about latex allergy.

Among risk factors which were evaluated in this survey the most significant relationship was for food allergy (strawberry, tomatoes, carrot, melon, kiwi, etc.) this correlation was with both patient reports and SPT results. Also in our previous survey in dental workers, similar findings were obtained (Under published data). Hand dermatitis and atopia also have greater prevalence among who had latex related symptoms especially contact urticaria and positive SPT.

One of the common initiating and/or aggravating factors for hand reaction to latex gloves is heat and sweating which may be due to wearing inner cotton gloves. Since this covering is a relative barrier for allergic molecules to contact, its use is recommended (Pourpak *et al.*, 2004). In this study, most workers didn't prefer to use these inner gloves. Other factors including spina bifida and multiple surgeries were not evaluated since minimum number of this patient had several surgical operations.

In this survey, percent of positive test in symptomatic cases was obviously more than other Iranian and foreign investigations (5.1 and 8%, respectively). This may be due to:

- Greater desire of cases with longer duration of problem to do this test.
- High probability for sensitization in dental workers compared with other HCWs.
- More hours of work each day in Iran.

But Kose and Mandlraclgglu (2004) found that more than 40% of HCWs have positive results.

Latex gloves from different manufactures vary in amount of latex protein detectable on the surface. In our clinic only one type of gloves were used and there is no little doubt that evaluating of type of gloves was impossible.

In our opinion shortcomings of this study were:

- Absence of control groups (other healthcare workers or ordinary civilians for example office workers). Although prevalence of allergy is thought to be much lower among non-latex users significantly, but selection of control group help to interpret the results much correctly.
- After filling of questionnaire, just SPT was done on voluntaries. According to literatures after being carefully questioned regarding symptoms of type one hypersensitivity, screening with Radioallergosorbent assay (RAST) should be done to detect specific IgE. If negative, Use test of latex gloves is carried out and finally SPT is used to detect sensitization.
- Measure of serum specific IgE was not done, although SPT has higher sensitivity and specificity than IgE determination.

In summary the results of present study indicate that allergic reactions to latex gloves are more prevalent in dental workers than other HCWs in other similar studies. This reaction was higher in woman and no differences were found among various jobs. Furthermore, history of atopia, hand dermatitis and food allergy had a positive correlation with incidence rate of reactions and for only one condition of workplace (gloves exchange rate).

ACKNOWLEDGMENTS

This study is part of research program that funded and financially supported by Military Health Research Centre in Baqiyatallah (a.s) Medical Science University. We would like to thank Dental Manager of Academic Clinic of Baqiyatallah Medical Sciences University for valuable assistants and the staff for cooperation.

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